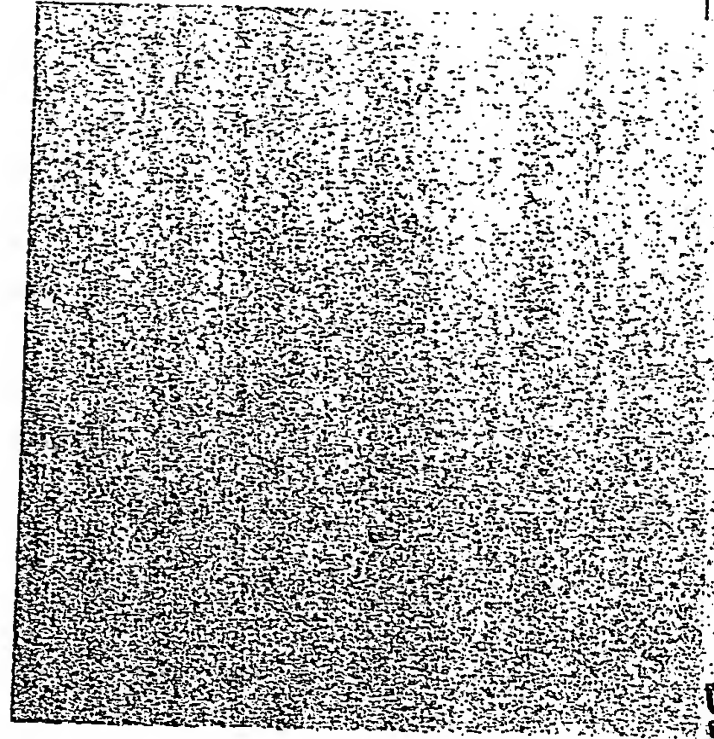


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Smith & Patti, LLC

No. 0970 P. 34

Japanese Kokai Patent Application No. Sho 62[1987]-270506



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JAPANESE PATENT OFFICE
PATENT JOURNAL
KOKAI PATENT APPLICATION NO. SHO 62[1987]-270506

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ANTIBACTERIAL AGENT

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[There are no amendments to this patent.]

Claim

A type of antibacterial agent containing 4,5-dichloro-2-octylisothiazolin-3-one and at least one compound selected from the group of methylene bithiocyanate, 2,2-dibromo-3-nitropropionamide, 1,3-dibromo-5,5-dimethylhydantoin, 4,5-dichloro-1,2-dithiol-3-one, and hexabromodimethylsulfone.

Detailed explanation of the invention

Industrial application field

This invention pertains to a type of antibacterial agent for water application systems.

Prior art

In cooling water systems, problems often occur due to the formation of slime by zooglea[transliteration]-shape bacteria, algae, filamentous microbes, etc. As a result, thermal efficiency decreases, and the water quality degrades. In addition, local corrosion may occur in the equipment and pipeline. Also, in paper pulp water system, slime problems caused by bacteria, filamentous microbes, yeasts, etc. mainly occur in the paper making step of operation. As the slime mixes as a foreign object in the pipe slurry, the quality of the paper product degrades, and paper breakage may take place, leading to a stoppage of continuous operation of the paper making machine. This leads to significant decrease in production efficiency.

In order to prevent such slime problems, it is necessary to kill the aforementioned slime-forming microbes or inhibit their growth. For this purpose, isothiazolone-based compounds, which may be used either alone or as a mixture with other antibacterial agents, have been proposed as an antibacterial agent (Japanese Kokoku Patent No. Sho 46[1971]-4199, Japanese Kokai Patent Application No. Sho 60[1985]-84203, etc.).

Problems to be solved by the invention

However, the aforementioned conventional methods may not prevent the slime problems well. In particular, when said isothiazolone-based compounds are used for a long time, the slime-forming microbes develop a resistance to it and grow selectively. In addition, in recent years, there has been a demand for lower treatment costs. Consequently, there is a demand for the development of a type of antibacterial agent with a greater effect.

Means to solve the problems

In order to solve the aforementioned problems, the present inventors performed extensive research. As a result of this research work, it was found that when a prescribed type of isothiazolone-based compound and a prescribed type of antibacterial agent are combined, a synergistic effect that has not been known can be displayed. As a result, this invention was reached.

That is, this invention provides a type of antibacterial agent containing (A) 4,5-dichloro-2-octylisothiazolin-3-one and (B) at least one compound selected from the group of methylene bithiocyanate, 2,2-dibromo-3-nitropropionamide, 1,3-dibromo-5,5-dimethylhydantoin, 4,5-dichloro-1,2-dithiol-3-one, and hexabromodimethylsulfone.

According to this invention, there is no special limitation on the ratio of component (A) to component (B). Usually, however, the ratio is in the range of 10:1 to 1:200. The optimum ratio of the components can be determined easily using the method explained later.

As far as the method for application [of the antibacterial agent] of this invention is concerned, it is the same as in the prior art, that is, one may simply add the antibacterial agent to the water system for treatment. In this case, one may premix component (A) and component (B) at prescribed concentrations, and add the mixture after it is well mixed. Also, one may add these components separately at their respective concentrations to the water system under treatment.

The concentration of the antibacterial agent added depends on the water system under treatment. It is usually in the range of 0.5-500 mg/L.

Also, the antibacterial agent of this invention may be in powder form as is, or it may be prepared as an emulsion by means of a surfactant, or as a solution prepared by means of a solvent. Examples of solvents that may be used include water, alcohols, acetone, dimethyl sulfoxide, ethylene glycol ether, and other organic solvents. In particular, because component (A) of this invention is barely soluble in water, it is preferred that an organic solvent be used to dissolve it.

It is preferred that the antibacterial agent of this invention be applied in an opened or sealed cooling water system or in a paper pulp water system.

Function

According to this invention, due to the synergic effect of the antibacterial function of component (A) and the antibacterial function of component (B), an antibacterial effect much higher than that when each component is used alone can be realized.

In the following, this invention will be explained in detail with reference to application examples.

Application examples

Using *P. aeruginosa*, the minimum growth inhibiting concentration (MIC₂₄) was determined.

The test condition is as follows. 10⁶/mL of said bacteria were inoculated into a liquid culture with a pH of 7 and having a peptone-yeast extract base (containing 1 g/L of peptone and 1 g/L of yeast extract). Then, the antibacterial agent of this invention was added at a prescribed proportion, followed by culturing with shaking at 30°C for 24 h.

Compositions of the antibacterial agents used in the test are as follows.

Case 1: (A) 4,5-dichloro-2-octylisothiazolin-3-one and (B-1) methylene bithiocyanate

Case 2: (A) and (B-2) 2,2-dibromo-3-nitropropionamide

Case 3: (A) and (B-3) 1,3-dibromo-5,5-dimethylhydantoin

Case 4: (A) and (B-4) 4,5-dichloro-1,2-dithiol-3-one

Case 5: (A) and (B-5) hexabromodimethylsulfone

The results are shown in Figures 1-5.

It can be seen that compared with the cases when each component is used alone, the antibacterial function is much higher when the components are used together.

Effects

The antibacterial agent of this invention has an excellent antibacterial activity due to the synergistic effect. As a result, it is possible to improve the treatment efficiency and the reduce the treatment cost.

In addition, the antibacterial spectrum is wider than that when each component is used alone. In addition, it has a good durability, and can be used for a long time.

Brief description of the figures

Figures 1-5 illustrate results of an application example of this invention.

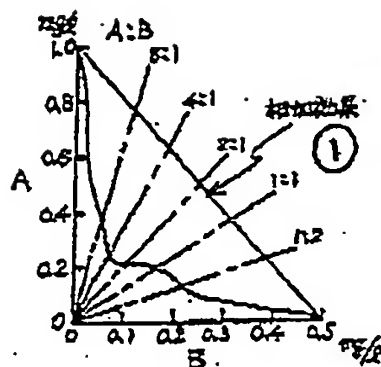


Figure 1

Key: 1 Synergistic effect

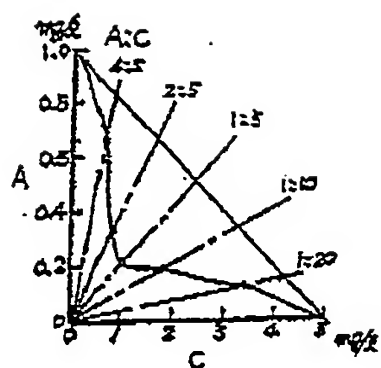


Figure 2

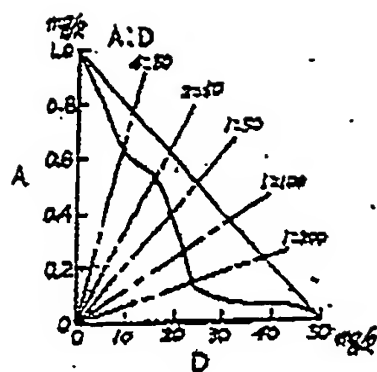


Figure 3

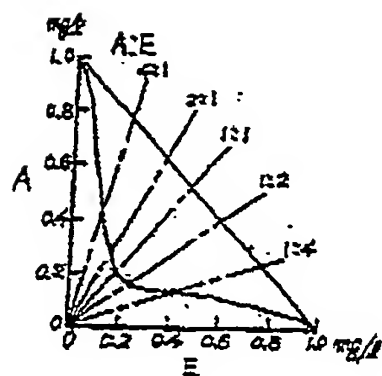


Figure 4

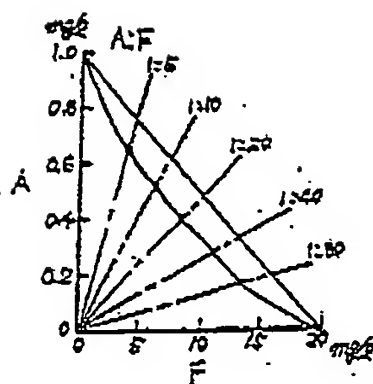


Figure 5

(5a)

⑩ 日本国特許庁(JP)

⑪ 特許出願公開

⑫ 公開特許公報(A)

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⑭ 公開 昭和62年(1987)11月24日

審査請求 未請求 発明の数 1 (全4頁)

⑮ 発明の名称 抗菌剤

⑯ 特 願 昭61-115038

⑰ 出 願 昭61(1986)5月20日

⑱ 発 明 者 望 月 富 士 秋 厚木市森の里若宮7番1号 栗田工業株式会社総合研究所
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最終頁に続く

明 細 書

1. 発明の名称

抗 菌 剤

2. 特許請求の範囲

4,5-ジクロロ-2-オクタリソチアゾリン-3-オンと、メチレンビスチオシアネート、2,2-ジブromo-3-ニトリロプロピオンアミド、1,3-ジブromo-5,5-ジメチルヒダントイン、4,5-ジクロロ-1,2-ジチオール-3-オン及びヘキサブromoジメチルスルホンから成る群から選ばれる少なくとも1種とを含む抗菌剤。

3. 発明の詳細な説明

〔産業上の利用分野〕

本発明は用水系の抗菌剤に関するものである。

〔従来の技術〕

冷却水系においては、メーグレア状細菌、藻類、糸状菌等によるスライム障害が引き起こされる場合が多い。その結果、熱効率の低下や通水の悪化をもたらすばかりでなく、機器、配管

等の局部腐食発生の原因ともなっている。また、紙パルプ水系においては、細菌、糸状菌、酵母類によるスライム障害が主に抄紙工程で引き起こされる。スライムはパイプスラリーの異物として混入すると、製品の品質を低下させるばかりでなく、紙切れを生じ抄紙機の連続運転を阻害する要因となり生産効率を大幅に低下させる。こうしたスライム障害を防止するには、上記のようなスライム構成菌を破壊又は成長阻害する必要がある。このため従来より抗菌剤として、イソチアゾロン系化合物が単独で、又は他の殺菌剤との併用で各種提案されている(特公昭46-4199、特開昭60-84203等)。

〔発明が解決しようとする問題点〕

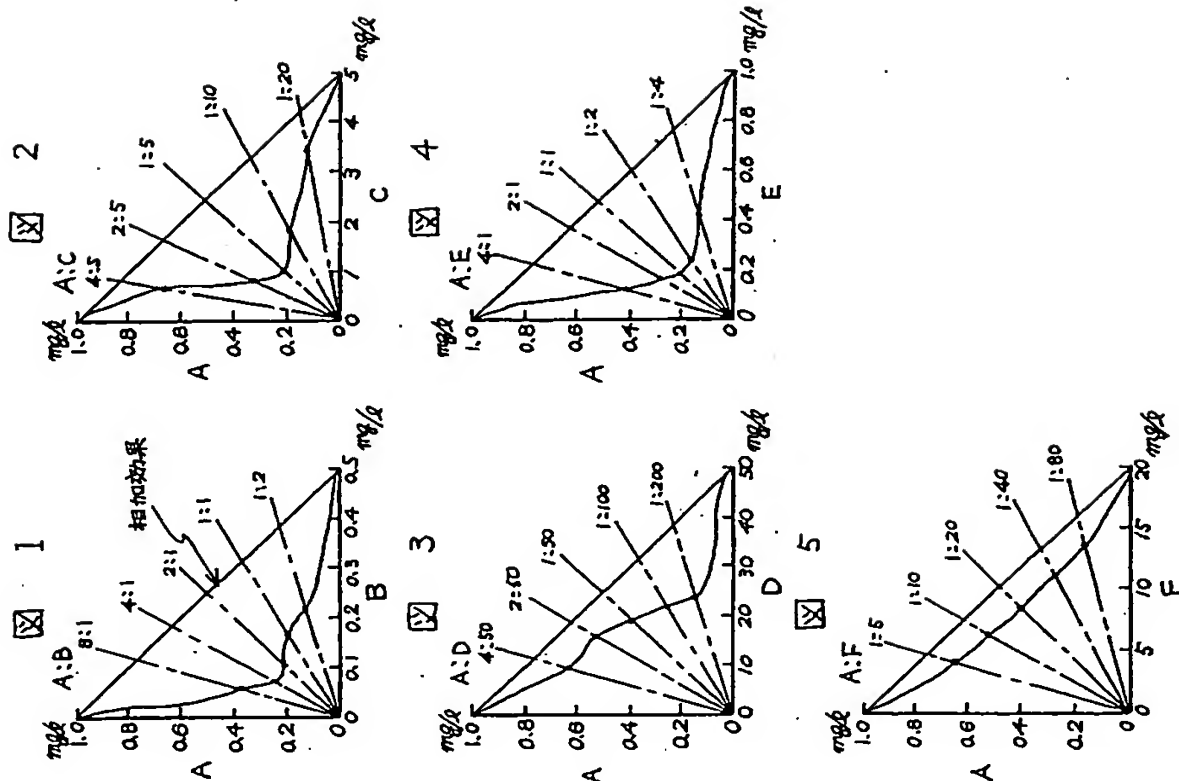
しかしながら、従来の提案方法によっては必ずしもスライム障害を十分に防止することはできなかった。特にイソチアゾロン系化合物は、長期的に使用するとスライム構成菌に耐性がつきやすく、抵抗性のある細菌が優先しやすいということが知られている。更に、近年は処理コ

特開昭62-270506(3)

示す図である。

特許出願人 栗田工業株式会社

(7)



EUROPEAN PATENT OFFICE

Patent Abstracts of Japan

PUBLICATION NUMBER : 62270506
PUBLICATION DATE : 24-11-87

APPLICATION DATE : 20-05-86
APPLICATION NUMBER : 61115038

APPLICANT : KURITA WATER IND LTD;

INVENTOR : KIUCHI KOJI;

INT.CL. : A01N 47/48 A01N 43/80 //(A01N 47/48 , A01N 43:80), (A01N 43/80 , A01N 37:34), (A01N 43/80 , A01N 43:50), (A01N 43/80 , A01N 35:06), (A01N 43/80 , A01N 47:02)

TITLE : ANTIBACTERIAL AGENT

ABSTRACT : PURPOSE: To provide an antibacterial agent containing 4,5-dichloro-2-octylisothiazolin-3-one and an antibacterial agent such as methylene bithiocyanate, etc., exhibiting excellent antibacterial activity by synergistic effect, capable of reducing treatment cost and useful for the treatment of irrigation system.

CONSTITUTION: The objective agent contains (A) 4,5-dichloro-2-octylisothiazolin-3-one and (B) one or more components selected from methylene bithiocyanate, 2,2-dibromo-3-nitrilopropionamide, 1,3-dibromo-5,5-dimethylhydantoin, 4,5-dichloro-1,2-dithiol-3-one and hexabromodimethylsulfone. The ratio of the component A to the component B is usually 10:1~1:200. The components are compounded with each other and applied to the water system to be treated.

EFFECT: The antibacterial spectrum can be broadened compared with the separate use of each component. The development of resistant strain is suppressed and the agent can be used over a long period.

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